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Hon. Commissioner of Patents and Trademarks  
**Amendment**  
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Statement Accompanying Substitute Specification

ZTENG  
I, the applicant, Yin-Shang states that the substitute specification  
currently submitted includes no new matter under 37 CFR 1.125(b).

Applicant :

Signature: Yin-shang Zieng 2007/2/15

# **A HOUSEHOLD DIGITAL AUTOMATION CONTROL SYSTEM**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

5       The present invention relates to a monitoring and controlling device ~~monitored control system~~, and more particularly especially to a household digital automation control system which allows the electric appliances to have a broader signal-receiving area and also be controlled by one and the same input. ~~that by an actuating input apparatus all electrical appliances in the house are integrated and controlled even overrun their original control ranges.~~

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### **2. Description of the Related Art**

15       People use more and more electric appliances in the various electrical appliances are increasing in people's daily life, such like TV, air conditioner, stereo equipment hi-fi equipment, and so on. ~~The aforesaid electric appliances all have particular remote controls for users, and even the switches of light or power source have their specific remote controls as well. The working principle of the remote controls is to send infrared signals to the infrared receivers of the electric appliances and to control them.~~ even developed to remote on-off control lamps or power, all these electric appliances may be matched with a remote control respectively for controlling them by operating on the remote control, in which the principle

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is that the remote control emits infrared ray signal to the infrared receiver set upon the electric appliance so as to control the action of the electric appliance.

However, the way of controlling the electric appliances by emitting and receiving infrared will be limited in area because it needs the user to hold the remote control directly aiming at the electric appliance. If the user stands out of the covering area of the infrared receivers of the electric appliance But, in this way emitting and receiving infrared ray, the user has to hold the remote control to aim to the controlled electric appliance exactly, meanwhile has to keep in a certain range, so that if the user goes out a little bit of the limited control range, he can not control the electric appliance any more, so. Therefore, it puts the user to inconvenience.

Therefore, a household automation control system was invented was provided by some manufactures, as shown in Fig. 1, Said household automation control system comprises which is comprised of a transmissive infrared ray remote control 80 for infrared transmitting, a plurality of, several transmitters 81 placed in different rooms 90 and 90', a control center 82, a receiver 83 connecting to the transmitters 81, connected with said transmitter 81, and an emitting unit 85 for receiving signals from the control center 82 to control and a relay transmitter 85 receiving the signal from said control center 82 further to remote control the electric appliances 84 (like TV and so

on). With the remote control 80 sending an infrared signal to the receiver 83, the transmitter 81 is therefore controlled to emit an RF signal to the control center 82. Said signal is then converted into an infrared signal by the control center 82 and sent to each electric appliance 84 in the room 90' by the emitting unit 85. by sending out an infrared ray signal aiming to the receiver 83 from the remote control 80, thereby to make the transmitter 81 emit a RF (radio frequency) signal to the control center 82, therein the RF signal is transferred to the relay transmitter 85 finally to emit an infrared ray signal to control the electric appliance 84 on-off in the room 90' locating the control center 82.

But, in practice, a fact is found that the infrared ray signal emitted from the remote control 80 has to directly shoot on the receiver 83 without any block, so that the receiver 83 can receive the infrared ray signal further to control next chain, in a word, when the remote control 80 is not in a same room with the receiver 83, all the control operation is not able to carry out, so it will bring up some inconvenience, hence in this case, just depending on the number of rooms, to allocate coordinating number sets of transmitter 81, control center 82, receiver 82 and relay transmitter 85, therefore the equipment cost is gone up, so it is not a perfect resolution.

However, while the remote control 80 sends an infrared signal to the receiver 83, the receiver 83 can receive said

infrared signal only if there is no bafflement between it and the remote control 80. That means, if the remote control 80 does not send the signal from the room 90 where the receiver 83 located, the receiver 83 will not able to receive said signal. This is really practically inconvenient.

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One way to solve this problem is to add more transmitters 81, control centers 82, receivers 83 and emitting units 85. However, this is not a cost-effective way to do it.

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## SUMMARY OF THE INVENTION

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Therefore, the purpose~~object~~ of the present invention is to provide a digital household automation control system which is convenient and is controlled by the inputs from multiple sources.~~that integrates multiple actuating input apparatuses for control operation.~~

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~~For achieving the object mentioned above, the digital household automation control system of the present invention utilizes a relay transmitter processing the RF signal emitted out from an actuating input apparatus in converting treatment into an infrared-ray signal, then emit the infrared-ray signal to the proper matching electric appliance and controller to carry out control function, because the RF signal is more powerful in intensity and penetrability than infrared-ray signal, the receiving effect is not affected by some facts such like surrounding environment or limited receiving range and so on, meanwhile it converses to the infrared-ray signal more efficiently~~

and accurately to control the electric appliances and controller action, in addition, the relay transmitter integrates all of the infrared-ray signals of the electric appliances and controllers at inside, so in the daily life,  
5 just need to operate on a single actuating input apparatus can control all the electric appliances; of course, operating on the actuating input apparatus can directly or indirectly adjust and switch the controller via the relay transmitter for increasing the convenience in the daily  
10 life.

The digital household automation control system in accordance with the present invention utilizes a relay device to receive RF signals from an input, and then converts said RF signals into infrared signals and sends them to the specific electric appliances and controllers. Due to the RF signals being stronger than the infrared signals and having a better penetrating power, they are not limited by the environment or the scope of the receiving area. Moreover, the converted infrared signals are able to control the electric appliances and controllers more effectively and accurately. Furthermore, because the relative infrared signal to each electric appliances and controllers are all integrated in said relay device, one input can control all the home electric appliances. Certainly, said input can control said controllers directly or indirectly through said relay device. The convenience in managing a house  
20 therefore increases.  
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The advantages of the present invention over the known prior art will become more apparent to those of ordinary skilled in the art upon reading the following descriptions in conjunction with the accompanying drawings.

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### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawing is included to provide a further understanding of the invention, and is incorporated in and constitutes a part of this specification. The drawing illustrates an embodiment of the invention and, together with the description, serves to explain the principles of the invention. In the drawing,

Fig. 1 is a block diagram of the prior art.

Fig. 1 is a perspective view showing a conventional household automation control system.

Fig. 2 is a perspective viewblock diagram showing the circuit of the first preferred embodiment of the present invention.

Fig. 3 is a perspective viewdiagram showing the setup of the controllerconnection of the controller of the first preferred embodiment of the present invention.

Fig. 4 is a perspective viewblock diagram showing the circuit of the second preferredthe second embodiment of the present invention.

Fig. 5 is a perspective viewblock diagram showing the circuit of the third preferredthird embodiment of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

Before describing the preferred embodiments of the present invention, note that similar components mentioned in following are given a same symbol number.

Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

Referring to Fig. 2, the first preferred embodiment of the present invention provides the first preferred embodiment of a digital household automation control system comprises, which includes an actuating input apparatus 1, a relay device transmitter 2 and a plurality of several controllers 30; wherein, the input actuating input apparatus 1 is a remote control 10 in this embodiment, and the remote control 10 includes a RF-transmitting unit 101 emitting RF signals in proper time, and a plurality of proper number of numeric keys 102. Each key 102 represents one controlled, in which each one is pre-configured into controlling an electric appliance (not shown in the figure drawings, such like TV, air conditioner, stereo equipment hi-fi equipment and so on) or a controller 30 (such like switch of light 31 and

switch of power source 32 lamp controller 31, and power controller 32 and so on) . While the user presses the key 102, an RF signal will be emitted to control the relative electric appliance or controller 30. Certainly, the remote control 10 is able to preset the quantity and the order of the electric appliances or the controllers 30 and code the aforesaid setting. Moreover, except emitting a group of RF signals to increase the quantity of controlling the electric appliances or the controllers 30, it can also avoid the neighbors being disturbed by said signals., depending on the necessary of the user, when pressing down each key 102 symbolized as a electric appliance or a controller 30, the remote control 10 will emit a coordinating RF signal to the controlled electric appliance or controller 30, certainly the remote control 10 can be pre-set a certain number and sequence of controlled electric appliance or controllers 30 and encoded in an addressing mode into one key for group control by emitting a cluster RF signals at one time to control a group of electric appliances or controllers 30 respectively and synchronously, thereby not only increase the quality of controlled electric appliances or controllers 30, but also avoid conflicting and interfering with neighbors as using.

To be more specific, except being a remote control 10, the input 1 in this preferred embodiment can respectively be a computer 41, a mobile communication unit 42, a network adapter 43, or a detecting actuator 44 as well. They will

be explained in the after mentioned descriptions. Particularly, besides above-mentioned input apparatus 1 can be a remote control 10, in the second preferred embodiment it can be a system consisted of computer 41, mobile communication unit 42, network adapter 43 and detecting actuator 44, wherein, the

A computer 41 has a host 411 and a peripheral controlling unit 412 connecting to the host 411, connecting with some ambient equipments 412, and a RF-transmitter 413 emitting RF signal is disposed on in the proper time set upon the host 411. The peripheral controlling units 412 is, such as, said ambient equipments 412 includes like wireless mouse and keyboard and so on (not shown in the figure drawings), control the RF signals from the transmitting unit 413 by working on the ambient equipments 412, so as to control the RF transmitter 413 emits RF signal. Certainly, the computer 41 is also able to connect with a network adapter 43, and the network adapter 43 allows users to connect with the computer 41 through the network. Moreover, the transmitting unit 413 sends RF signals to the relay device 2, and further controls the electric appliances and the controllers 30. Otherwise, the users can also set a setting of coding or timing control in the computer 41, and the host 411 will follow said setting to operate. the user also can operate the system through a computer connected with the network adapter 43 to remotely control the RF transmitter 413 via the network (like ADSL) emitting a RF signal to

the relay transmitter 2, further to control various electric appliances action and controller 30 switching, or pre-encode addresses and pre-set timer and so on in the computer, so that the computer can carry out the pre-set functions by itself automatically.

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The A mobile communication unit 42 includes a host 421, and a cell phone 422 connecting to the host 421 via the radiophone network, and a transmitting unit 423 for emitting RF signals is disposed on the host 421. The users therefore can control the host 421 by the set message signals, and further command the relay device 2 to control the in which the host 421 has a RF transmitter 423 built on for emitting RF signal in proper time, thereby the user can send a pre-set short message from the mobile phone to the host 421, further to remotely control the relay transmitter 2 to control the various electric appliances and controllers 30.

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The A detecting actuator 44 has is comprised of a detecting unit 442 for detecting and receiving the external changes, triggered by the signal of detecting and receiving any environment change, a central processing unit 441 for processing the signals came from the detecting unit 442, and a transmitting unit 443 for emitting the signals of the central unit 441; coming from the central processing unit 441, wherein, the detecting unit 442 can receive the feedbacks from the security system, not only connects to the security system (since it which is not the characteristic feathers of the present invention, so it is not described

in detail here) and announce the users through the mobile communication unit 42 or the network adapter 43, and it also can receive infrared detecting signals. While the infrared detecting signals are touched to start, the will operate the electric appliances or the switches 3 respectively or in group. The transmitting unit 443 will code and memorize the quantity and the order of the switches 3 first, and control them then, but also connects to temperature sensors, magnetic induction controller and so on for detecting the any change of the environment in temperature and open any doors or windows and sending the signals back; the abnormal situation is transferred to the user via the mobile communication unit 42 or the network adapter 43 to form bilateral communication, and it also can be connected to an infrared ray sensor for detecting any infrared ray source, so that once if said detecting actuator 44 is triggered by the detected infrared signal, the transmitting unit 443 will cut in an electric appliance or controller 3, or a group electric appliances and controllers 30 pre-coded in addressing model.

Additionally, the relay devicetransmitter 2 includes an RF relaysignalreceiving unit 21 and an infrared rayrelaysignaltransmitting unit 22; wherein, the RF receiving relay unit 21 canreceives the RF signals emitted from the remote control 1, andconverts into another signals for emitting to the infrared relay unit 22, and the infrared relay unit 22 will then emit infrared signals to control

the electric appliances and the controllers 30, and transfer the RF signal into another one sent to the infrared-ray signal transmitting unit 22 to make it emit an infrared-ray signal to control the various electric appliances or controllers 30; Besides, in another case, the relay device transmitter 2 includes an infrared-ray signal receiving unit 23, and a memory unit 24 connecting with the infrared signal receiving unit 23. The infrared signal receiving unit 23 receives the infrared signals from the electric appliances and the controllers 30 and sends said infrared signals to the memory unit 24 for memorizing. Said infrared-ray signal receiving unit 23 can receive and learn all the remote controlling signals of the electric appliances and controllers 30 controlled by the relay actuator 2, and save them into the memory unit 24.

Referring to Cooperating to referred Fig. 3, the switches 3 used in household in common are divided to switches of light 31 and switches of power source 32, into lamp controller 31 and power controller 32 two sorts. However, both of them connect to a live line 36 and a ground line 34 from an external power source 35. Each controller 30 can work well if it connects to both the external power source 35 and the ground line 34. A ground wire 38 installed inside a wall 37 is not used here, so the users do not need to dig the wall 37 for connecting the ground wire 38. It is convenient in installing. Besides, each controller 30 has a receiver 301,

a central processor 302, and controlling unit 303 controlled by the central processor 302; wherein, the receiver 301 receives the infrared signals from the relay device 2 and then sends said infrared signals to the central processor 302 for comparing and analyzing, and further drives the controlling unit 303 to control the switch of light 31 and switch of power source 32. whatever the lamp controller 31 or the power controller 32, it always connects with the fire line 36 of the power source and the load line 34 with the both ends respectively, just like replacing the conventional switcher on the wall without any extra process needed to be done; in the other hand, each controller 30 is comprised of a receiving unit 301, a central processing unit 302 and a controlling unit 303, wherein, the receiving unit 301 can receive the infrared ray signal from the relay transmitter 2, and send the signal to the central processing unit 302, therein comparing, analyzing treatment, then to drive the controlling unit 303 to control the lamp controller 31 or power controller 32 and so on actions.

Referring to Fig. 2 and Fig. 3, while in operation, as using the embodiment of the present invention, the user can directly press down the key 102 of the remote control 1-. Except the preset and saved code to the relative electric appliances and the relative controllers 30, each key 102 can also be preset the coding of the quantity and the order of the electric appliances and the controllers 30 following the group mode. in which the key 102 has pre-set and saved

with the coded address of coordinating electric appliance and controller 30, meanwhile it also can be pre-set a certain number and sequence of controlled electric appliance or controllers 30 and encoded in an addressing mode. Therefore, after pressing so as to press down each key 102, a relative RF signal will be sent to to emit a coordinated RF signal to the transmitting RF receiving unit 21 of the relay device transmitter 2 and it can also avoid the neighbors being disturbed by said signals., and efficiently avoid conflicting and interfering with neighbors as using. Then, it will be converted into another signal and sent to the infrared relay unit 22. After that, the infrared relay unit 22 will send an infrared signal to the relative electric appliances or the relative controllers 30 to control them.

To be more specific, the controllers 30 are shown differently due to the different types of the switches of light 31 and the switches of power source 32 in different household. Here the switch of light 31 is taken as an example. With the application of the live line 36 and the ground line 34, except turning on and off the light, it can also control the light intensity of a filament lamp (not shown in the figure) through its switch of light 31 and the usage of the loop of an electricity-saving bulb through its switch of light 31. Otherwise, the switch of power source 32 is directly controlled by the controller 30. and the RF signal is transferred into another one sent to the infrared-ray signal transmitting unit 22 to make it emit an infrared-ray

signal to the various electric appliances or controllers 30 to control them cut in or off, especially to said controllers 30, depending on the different sort of the lamp controller 31 or power controller 32 set in the household, may be some different in structure, taking the lamp controller 31 as an example, it is connected with a fire line 36 and a load line 34 with the both ends, besides cutting in or off, also increases an illumination adjustor for controlling the light intensity as using; to the power controller 32, it is directly controlled to cut in or off by the controller 30.

Continuing with the afore description, due to the RF signals being stronger than the infrared signals and having a better penetrating power, the user can press the keys 102 to emit RF signals anywhere under the controlling area. Moreover, the RF signals will be converted into infrared signals, and said infrared signals can effectively and accurately control the electric appliances or the controllers 30 and avoid being affected by the environmental factors. Furthermore, the relay device 2 is controlled by the computer 41, the mobile communication unit 42, the network adapter 43, and the detecting actuator 44 respectively. Therefore, the users can choose to use the computer 41 or follow the conventional communication way or network to directly or indirectly control the input 1 to emit RF signals according to his position. Then, after receiving said signals, the relay device 2 converts them

into infrared signals for emitting, and hence controls the electric appliances or the controllers 30. Following above description, by means of the RF signal with more powerful in intensity and penetrability than infrared-ray signal, when pressing down the key 102 to emit RF signal, whatever the user stands in or out the range of the infrared-ray control, the RF signal will be transferred into an efficacy and accuracy infrared-ray signal to control the electric appliances or controllers 30, meanwhile avoid range and environment limiting and affecting the transmission of the control signal, in addition, the relay actuator 2 can be controlled respectively by the computer 41, the mobile communication unit 42, the network adapter 43 or the detecting actuator 44, so wherever the user stays, and whatever he selects to operate on computer 41, or personal mobile or network IP communication apparatus, to directly control or actuate pre-coded addressing model or timing model remotely to trigger the input apparatus 1 to emit a RF signal, further to control the relay transmitter 2 to transfer the RF signal into an infrared-ray signal given out, thereby control the electric appliances and the controllers 30 action.

Continuing with the afore description, if a user wants to increase an electric appliance or a controller 30 for controlling, the only thing he needs to do is to emit infrared signals from the infrared remote control (not shown in the figure) of the afore mentioned electric appliance or

controller 30. Then he just waits for the infrared signal receiving unit 23 of the relay device 2 to receive said infrared signals. The relay device 2 will send new infrared signals to the memory unit 24 for memorizing, and the user can therefore control the new set electric appliance or controller 30. In this preferred embodiment, the memory unit 24 of the relay device 2 is used to save the infrared signals of the electric appliances. Therefore, the remote control 1 in this preferred embodiment has the function of operating one electric appliance once or operating a group of electric appliances at the same time. To achieve the afore mentioned function, the user only needs to use the input 1 for controlling. Further with the communication and the network, the convenience of daily life will therefore increase. Following above description, in the preferred embodiment of the present invention, if want to increase some the electric appliances and controllers 30, just need to send the infrared ray signals of their original matched remote controls (not shown in drawings) out for receiving by the receiving unit 23 of the relay transmitter 2, in which the relay transmitter 2 can save the new infrared ray signals into the memory unit 24 for facilitating to the user controlling the increased electric appliances and controllers 30 afterward as well as operating in the above mentioned way; because the memory unit 24 of the relay transmitter 2 has saved many infrared ray signals of various electric appliances and controllers, so the remote control

1 of the preferred embodiment has one-to-one control or simultaneous control a group of various electric appliances or controllers 30 functions, for this just need to operate on the input apparatus 1, if increase the assistance of linking the communication and network, the life will become more convenient.

Fig. 4 is referring to Fig. 4, the second preferred embodiment of the present invention is shown, in the digital household automation control system; wherein, the RF signals emitted from the input apparatus 1 can be received and controlled by the RF relay unit 21 of the relay device 2 as mentioned in last preferred embodiment, or they also can be directly received by the receiver 301 of the controller 30 as this preferred embodiment and does not need the relay device 2 for converting. The receiver 301 then sends said signals to the central processor 302 for comparing and analyzing, and further drives the controlling unit 303 to control the switch of light 31 and switch of power source 32. Therefore, this preferred embodiment achieves the same effect not only can be received by the receiving unit 21 of the relay transmitter 21, but also can be received by a receiving unit 301 attached in the controller 30 directly without transferring via the relay transmitter 2, then send the signal to the central processing unit 302, therein comparing, analyzing treatment, then to drive the controlling unit 303 to control the lamp controller 31 or power controller 32 and so on to adjust the light intensity

~~or cut in off to get the functions as described in the first preferred embodiment.~~

Fig. 5 is Referring to Fig. 5, it shows the third preferred embodiment of the present invention, wherein, an RF relay unit 103 is disposed on the input 1 and a signal transmitting unit 304 is disposed on the controller 30. After the input 1 controls the controller 30 directly or indirectly through the relay device 2 to operate, the controller 30 will send a feedback through the signal transmitting unit 304. Moreover, said feedback will be received by the RF relay unit 103. Therefore, the user will understand the controlling status of the controller 30.~~the input apparatus 1 is attached with a RF receiving unit 103, and the controller 30 is built upon with a RF signal transmitting unit 304, so when operating on the input apparatus 1 to directly or indirectly control the relay transmitter 2, the user can get some feedback message from the controllers 30 after they are controlled to carry out adjusting or cutting in off by the RF signal process via the RF transmitting unit 304, so as to know the working status of the controllers 30.~~

According to the above description, and comparing the present invention with the conventional products, it will be easy to find that the present invention has the following advantages: some advantages as follows:

1. The present invention, in which a relay transmitter receiving a RF signal from a remote control, or circum-connected apparatuses and transferring it into an

infrared-ray signal and transmitting to the coordinated electric appliance or controller to control them action, takes the advantage of the RF signal with more powerful in intensity and penetrability than infrared-ray signal for avoiding affecting from the environment or the limited receiving range, so that the transferred infrared-ray signal performances more efficaciously and accurately to control the electric appliances and controllers, meanwhile integrate all the infrared-ray signals of controlled electric appliances into the relay transmitter for facilitating to the user operating on input apparatus beside hand to send out a RF signal, further to control a matched or a group encoded electric appliances and controllers cutting in off or adjusting for carrying out fully monitoring and controlling them in the daily life.

1. The present invention utilizes a relay device to receive RF signals from the relative multiple sources, such as remote control and peripheral equipments...etc, and then converts said RF signals into infrared signals for emitting to the relative electric appliances or controllers to control them. The RF signals being stronger than the infrared signals and having a better penetrating power, so they are not limited by the environment or the scope of the receiving area. Therefore, the converted infrared signals can control the electric appliances and controllers more effectively and accurately. Moreover, the infrared signal relative to each electric appliance

can be integrated to said relay device. The user can control the input to emit RF signals through any convenient way, and then he can choose to operate one electric appliance once or operate a group of electric appliances at the same time. Therefore, the user can monitor and control the electric appliances and the controllers, greatly improves the management of a house.

5 2. directly connected with a fire line and a load line just replacing the conventional switcher without re-hidden in the wall, so as to facilitate and simplifying mounting process, and increase adjusting light intensity function.

10 2. Direct to the controlling of the controller of the switches, such as the switch of light or the switch of power source...etc, it is to utilize a live line and a ground line connect with each other for controlling. It means that it only needs the controller to connect with the external power source for operating. The ground wire is not necessary here. Consequently, while installing, users do not need to dig the wall for connecting the ground wire. The complexity of the line of the switches will also debase. Therefore, it will be much convenient for installing. Moreover, the application of the controller can also be used in controlling the light intensity of a filament lamp disposed on the switch of light, and to the loop of an electricity-saving bulb.

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While the present invention has been described in connection with what is considered the most practical and

~~preferred embodiments, it is understood that this invention is not limited to the disclosed embodiments but is intended to cover various arrangements included within the spirit and scope of the broadest interpretations and equivalent arrangements.~~

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To sum up, the present invention certainly achieves the effect of enlarging the receiving area of the electric appliances and being controlled by the multiple inputs at the same time. Certainly, the present invention reaches its purpose.

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While we have shown and described the embodiment in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.

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**ABSTRACT OF THE DISCLOSURE**

The present invention provides a digital household automation control system, which utilizes a a relay device to receive RF signals from an input, and then converts said 5 RF signals into infrared signals and sends them to relative electric appliances and controllers. Therefore, it only needs one input to control all the electric appliances. Certainly, said input can command said controllers directly or indirectly through said relay device for controlling 10 the switches. The convenience of daily life therefore increases. ~~relay transmitter processing the RF signal emitted out from an actuating input apparatus in converting treatment into an infrared ray signal, then emit the infrared ray signal to the proper matching electric 15 appliance and controller to carry out control function, so in the daily life, just need to operate on a single actuating input apparatus can control all the electric appliances; of course, operating on the actuating input apparatus can directly or indirectly adjust and switch the controller via the relay transmitter for increasing the 20 convenience in the daily life.~~